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3D DIGITAL TECHNOLOGY APPLICATION IN AN ANATOMICAL MODEL OF WAX: MEDICI VENUS OF "JAVIER PUERTA" ANATOMY MUSEUM (Faculty of Medicine. Complutense University of Madrid)

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Introduction

This work is focused in one of the sculptures that compose the collection of wax anatomical models wax of the Museum of Anatomy "Javier Puerta", Faculty of Medicine, at Universidad Complutense de Madrid. It is a natural size sculpture with round bulk that was created between 1786-1787 by the anatomical dissector Ignacio Lacaba in the cabinet of the Real Colegio de Cirugía de San Carlos de Madrid, and it was denominated Venus de Medici. It represents a dissection of mammary glands and abdominal vascularization.

The sculpture has serious damages in its structure that involve a high risk during its manipulation, for this reason we have resorted to digital tools to that make possible the virtual recreation of the model and we have proposed diverse solutions for the treatments of conservation and restoration.

Objetive

- Create and design digital mapping for 3D damage maps.
- Design a decision-making model that includes all the factors to evaluate in order to determine restoration options and propose specific treatments adjusted to the type of damage to be treated.
- Develop a 3D virtual model that allows visual assessment of the deterioration extent and allows to carry out various restoration solutions that minimize the direct manipulation risks of the sculpture due to its serious preservation state.

Methodology

Regarding the documentation we have of the sculpture, it was developed a 3D model that recreates in a virtual way the original sculpture and the showcase in which it is exposed in the room.

The photogrammetric process of the work has been carried out with a Canon 1000D camera, with a 18-55mm lens. The photographs of the Venus de Medici sculpture have been made rotating around with the camera, and the photographs of the showcase and fragmented parts of the piece have been made rotating the object and keeping the camera fixed. In both cases, we have been used the following parameters: ISO 100, with a f / 11 diaphragm and 1/800 shutter. A "Hama Polarizer" filter has been used to reduce the high gloss of the wax. All photographs are digitally developed with Adobe ® CamaraRaw, and chromatic correction is performed based on the parameters indicated by the colorchecker card.

Digital photogrammetry was performed using Photo Scan® and the obtained models were then treated with Blender® . The treatment of all these recreated models has been studied through virtual reality in Sketchfab® platform.

All these previous studies have established a diagnosis of the piece that has allowed to assess its stability and proceed to propose a conservation-restoration project.

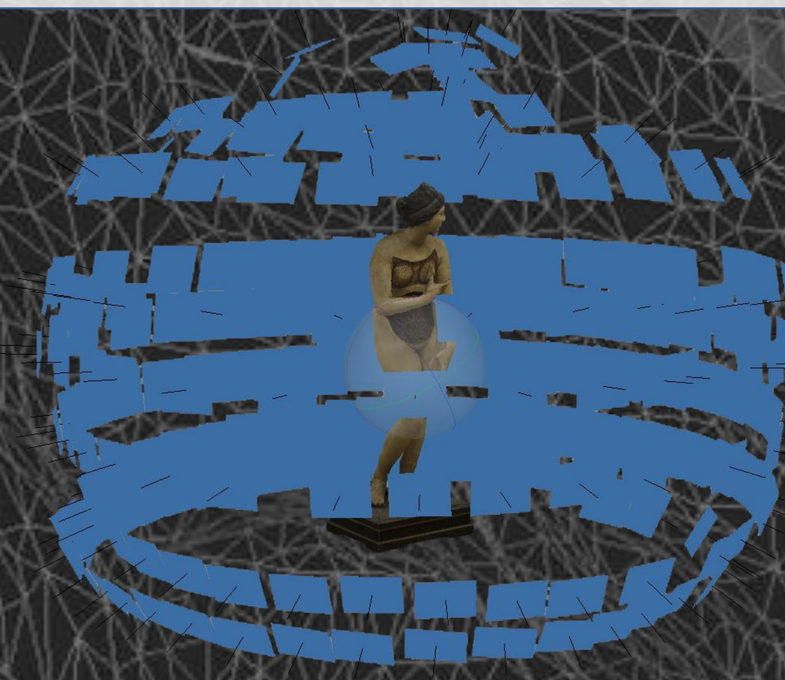
3D sculpture virtualization

The Venus de Medici is in a critical state of conservation, its manipulation involves a high risk, so it is considered essential the digitization of the model and its reproduction to have an exact copy to project the different treatment options.

The total of photographs exceeds 900, of which 289 are of the Venus de Medici, in eight rings; 152 of the case, in six rings; And 482 of the abdomen and the breasts. The process of creating the models consists first in a phase of orientation of photographs, which concludes with a first "Cloud of points". This generated points are the parameters that make coincide all the photographs at the same point. Then, the "dense point cloud" is elaborated for greater precision. The third step and one of the most important is the "Polygonal mesh" because it joins all the points through lines creating the volume of the sculpture. Finally a texture map is made that overlaps the net generated.

Given the high production of polygons in the net that exceeds in each piece the 2,000,000 vertices, we have done a "Retopology" of the net in order to reduce the polygons and be able to handle and treat the piece, in addition to be able to upload them to different platforms, unthinkable in first place given the high weight that these models carry.

The "retopology" of the net has been reduced from 2,100,254 to 300,000 vertices without modifying the volume or texture of the model. Once the model is obtained, the range of possibilities for study, diagnosis, hypotheses and intervention strategies is vast.



Realization the photogrammetry with software *Photo Scan®*

Results

3D digital cartography of the sculpture

Articulated frame design with extensible and adjustable arms

Design of a bed with support points with semi-rigid foam (Foam type lined with tissue paper)

Virtual removing of the film-forming film

Virtual reconstruction of the model as it could be in origin, with chest and abdomen covered

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Conclusions

Obtaining different models through photogrammetry and its subsequent treatment with different software, allows the restorer a range of possibilities to project solutions without having to manipulate the piece and, consequently, contributing to minimize additional risks and contributing to taking decisions to made in the work; it is ,without question, a very useful tool within the decision-making model. The extensive documentation generated in this three-dimensional way, has surpassed the traditional two-dimensional documentation, offering much more complete data of the object / work of art to be preserved.